

Notice of Allowability

Application No.

10/670,660

Applicant(s)

YU ET AL.

Examiner

Art Unit

Belur V. Keshavan

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 5/24/2005.
2. ☒ The allowed claim(s) is/are 1-12 and 14-17.
3. ☒ The drawings filed on 24 September 2003 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

DETAILED ACTION

Status Of Claims

Claims 1-12 and 14-17 are in the application.

Allowable Subject Matter

Examiner's Statement As To The Reasons For The Allowance

The following is a statement of reasons for allowance:

The disclosure is related to a low dielectric constant copper diffusion barrier film formed of a silicon-based material doped with boron.

The primary reason for the indication of the allowability of claims 1-12 and 14-17 is the inclusion therein, in combination as currently claimed, of the limitation comprising inter alia the following limitations: a copper diffusion barrier film formed of a silicon based material doped with boron and maintaining a stable dielectric constant of less than 4.5 in the presence atmospheric moisture (claim 1), a partially fabricated semiconductor device comprising a metal interconnect formed substantially of copper wherein the copper diffusion barrier formed adjacent to the metal interconnect has a thickness in the range of 100 Angstroms to 1500 Angstroms (claim 8); a copper diffusion barrier film comprising a first film

of boron nitride or silicon boron nitride and a second layer comprising boron and one or more elements selected from the elements consisting of silicon, carbon, nitrogen and oxygen, where in the copper diffusion barrier film maintains a stable dielectric constant of less than 4.5 in the presence of atmospheric moisture (claim 17). The limitations found in claims 1-12 and 14-17 are neither disclosed nor taught by the prior art of record alone or in combination.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments On Statement Of Reasons For Allowance."

Remarks

At the request of Applicant an interview was held on 05/24/2005 with Mr. Roger Samson. The following were discussed:

Claims 14, 15 and 16 are dependent on allowed claim 1 and as such claims 14, 15 and 16 are allowable.

Rejected claim 8 will be amended to include the limitation of claim 13 that will be canceled.

In conclusion, Examiner informed Mr. Samson that after receiving the amendments the application would be examined in view of the updated pertinent references.

Contact Information


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Belur V. Keshavan whose telephone number is 571-272-1894. The examiner can normally be reached on 8-4:30 Monday to Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 571-272-1855. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

BVK. *BVK*
June 27, 2005.

Belur V. Keshavan.
Examiner. Art Unit 2823.


MATTHEW SMITH
SUPERVISORY PATENT EXAMINER
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